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UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

ACCIDENT EXPERIENCE AT PEBBLE-PHOSPHATE OPERATIONS IN FLORIDA 1930-40

BY

FRANK E. CASH

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ACCIDENT EXPERIENCE AT PEBBLE-PHOSPHATE OPERATIONS IN FLORIDA, 1930-40[1]

By Frank E. Cash[2]

INTRODUCTION

Data on the accident experience of the pebble-phosphate industry in Florida for 1939 and 1940 are combined in this report with statistics for the 9-year period 1930-38, inclusive, which were published in Information Circulars 6917[3], 6968[4], and 7100[5]. The periodic compilation and publication of such data enable the pebble-phosphate industry, as well as other industries, to consider the relative hazards, compare experience, and thereby help to prevent accidents.

ACKNOWLEDGMENTS

Accident data were furnished by the following operating companies: Amalgamated Phosphate Co., Brewster; American Agricultural Chemical Co., Pierce; Coronet Phosphate Co., Plant City; International Agricultural Corporation, Mulberry; Phosphate Mining Co., Nichols; Southern Phosphate Corporation, Bartow; and Swift & Co., Fertilizer Works, Bartow.

Production figures are from Mineral Resources of the United States and Minerals Yearbooks.[6]

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[1] The Bureau of Mines will welcome reprinting of this paper provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7186."

[2] District engineer, Bureau of Mines Safety Station, Duluth, Minn.

[3] Cash, Frank E., and Dempsey, Claud P., Pebble-Phosphate Accident Experience: Bureau of Mines Inf. Circ. 6917, 1936, 10 pp.

[4] Cash, Frank E., and Dempsey, Claud P., Pebble-Phosphate Mine Accident Experience: Bureau of Mines Inf. Circ. 6968, 1937, 12 pp.

[5] Cash, Frank E., and Colbert, George W., Accident Experience at Pebble-Phosphate Operations in Florida, 1930-38: Bureau of Mines Inf. Circ. 7100, 1940, 13 pp.

[6] Bureau of Mines, Mineral Resources of the United States, 1925-31 (before 1925, data assembled by the Geological Survey); Minerals Yearbooks, 1932-33-34-35-36-37-38-39 and 40.

The descriptive matter was taken in part from Bureau of Mines Bulletin 298[7]

PEBBLE-PHOSPHATE MINING DISTRICT

Most of the land pebble-phosphate district of Florida is in the western part of Polk County and the eastern part of Hillsborough County, but it extends south into the northwest corner of DeSota County and the northeast corner of Manatee County. The area now considered workable extends from near Plant City on the north almost to Bowling Green on the south - 30 miles in a northwest-southeast direction, with an average width of 10 miles.

PRODUCTION

Florida produces approximately 69 percent of the phosphate mined in the United States, and 96 percent of the Florida production is from the pebble-phosphate field.

Production of land pebble phosphate in Florida was begun in 1890; the first shipment was made in 1891; and at present, under normal conditions, annual shipments amount to about 3 million long tons.

MINING METHODS

The phosphate conglomerate or matrix is overlain by 10 to 50 feet of sand, sandy clay, or porous, friable sandstone, which constitutes the overburden. The overburden is removed either by traction, electric dragline excavators with 120- to 165-foot booms and 6- to 10-cubic-yard buckets and "spoiled" in areas from which the matrix has been mined, or it is removed hydraulically.

The matrix, which is 5 to 20 feet thick, is mined by hydraulic "giants" or "guns" that have a nozzle pressure of 170 to 220 pounds per square inch. Before mining is begun it is necessary to have a well, sump, or low place in which to accumulate the dislodged matrix picked up by the pumps. These wells or sumps are made by the excavator or by water pressure or are drill-blasted. After the sump is prepared and the pump connected, the bed of matrix is cut down by the hydraulic guns, flows into the sump, and is picked up by 10- and 12-inch centrifugal pumps driven electrically, handling 10 to 25 percent solids and using 2,500 to 4,000 gallons of water.

7/ Cash, F. E., and von Bernewitz, M. W., Methods, Costs, and Safety in Stripping and Mining Coal, Copper Ore, Iron Ore, Bauxite, and Pebble Phosphate: Bureau of Mines Bull. 298, 1929, 275 pp.

If the height or distance between sump and washer becomes too great, one or more relay or booster pumps are placed in the line between the pit and washer.

WASHING, RECLAIMING, AND DRYING

The matrix is discharged into processing plants called washers, in which it is dewatered, processed to remove slimes and clay, and screened to remove the sand and small pebbles of phosphate. The rejected fines are reclaimed later by flotation, and the washed phosphate pebbles are loaded into cars and hauled by steam or electric locomotives to the drying plant. The rock is dried in oil-fired rotary kilns at an average temperature of 225° F. at the discharge end and conveyed by belts to classified storage bins.

FLORIDA WORKMEN'S COMPENSATION ACT

The Florida Workmen's Compensation Act, passed by the 1935 legislature, became effective July 1, 1935. This act was amended by the legislature in 1937. The act is administered by the Florida Industrial Commission, consisting of a chairman and two members appointed by the Governor.

The act as amended provides for a 4-day waiting period and nonpayment of compensation during such period. It also provides that the industrial commission formulate and enforce safety rules and regulations and participate in accident-prevention activities.

All employers and employees, except a few specifically exempted, come under the act unless they file the required notice of nonacceptance and waiver of exemption, in which case the employer may not, in suits brought against him, use as defense negligence of a fellow servant, nor that the employee assumed the risk of his employment, nor that the injury was due to the contributory negligence of the employee; and the employee who refuses to come under the act, in any action to recover damages for injury or death brought against an employer who accepts the provisions of the act, may proceed as at common law; and the employer may avail himself of the defense of negligence of fellow servant, assumption of risk, and contributory negligence as such defense exists at common law.

Provisions are made for the employer to supply medical, surgical, hospital, and nursing attention that may be required during the period of recovery, not exceeding $250, except in surgical cases when the costs shall not exceed $500. If death results from an accident the employer must pay reasonable burial expenses, not exceeding $150.

Compensation is not allowed for the first 4 days. The amount of compensation shall not exceed $18 a week or be less than $4 a week unless at the time of the injury the employee's wages are less than $4 a week, when he shall receive his full weekly wage. Payments of compensation are made on the following basis: 50 percent of the average weekly wage if there are no dependents, 55 percent if one dependent, and 60 percent if more than one dependent. Payment is made for all temporary total disabilities and for the following periods in case of death or permanent disabilities; Death, 350 weeks; permanent total disability, 350 weeks; loss of arm, 200 weeks; leg, 175 weeks; hand, 150 weeks; foot, 125 weeks; eye, 100 weeks; thumb, 60 weeks; first finger, 35 weeks; great toe, 30 weeks; second finger, 30 weeks; third finger, 20 weeks; fourth finger, 15 weeks; toe other than great toe, 10 weeks; and loss of hearing, one ear, 40 weeks, and both ears, 150 weeks. Loss of both hands, both arms, both legs, and both eyes constitutes permanent total disability. In case of hernia, the burden of proof is on the employer.

The foregoing is abstracted from House Bill 29 as enacted by the 1935 Florida Legislature and amended in 1937 by the same body.

SAFETY ORGANIZATIONS

Every company in the pebble-phosphate district has a safety director and an employees' safety organization that holds regular, periodical meetings. Accidents and "near" accidents are discussed in these meetings, and suggestions are made for the prevention of similar accidents in the future; also, employees are encouraged to make suggestions for improving living and working conditions in and around the mines and plants.

One of the oldest and most active chapters of the Holmes Safety Associ tion in the United States is functioning in one of these mining communities, and all matters pertaining to safety are handled by the chapter.

All of the operating companies train some of their employees in first-aid each year. Most of them maintain 100-percent first-aid training annual upon a cooperative basis; in other words, all employees are trained annual by company instructors under supervision of an instructor from the Safety Division of the Federal Bureau of Mines.

The annual first-aid contest usually held as a part of or climax to the first-aid training each year was not held in 1939 or 1940; also, the number of men trained in first-aid declined during these 2 years.

ACCIDENT EXPERIENCE

Accident data were made available by all of the operating companies; to present them on a basis comparable with other industries (taking into consideration relative hazards), total days lost will be increased in some instances, as partial permanent disabilities are carried in the district as actual days lost and fatal accidents are charged by two companies without loss of time.

Partial and total permanent-disability and fatal-accident statistics uniformly comparable with those for other industries have been converted into their equivalent of days lost, according to the scale of time losses for weighting deaths and permanent injuries to show severity of injuries used by the Federal Bureau of Mines. (See table 1.)

Tables 2 to 5, inclusive, contain accident figures for the seven phosphate companies by months, age of injured, and nature and cause of injuries; tables 6 and 7 consolidate these figures for the pebble-phosphate industry; and table 8 compares the pebble-phosphate accident experience with that of other industries.

Table 2 shows that there is relatively little difference in the number of accidents for any month of the year; the greatest number of accidents for the period 1930-36, inclusive, occurred in September and October, and the smallest number in November and February; during 1937 and 1938 the greatest number occurred in December and the fewest in February.

TABLE 1. - Scale of time losses for weighting deaths and permanent injuries so as to show severity of injuries[1]

Nature of injury[2]	Degree of disability, in percent of permanent total disability	Days lost
Death	100	6,000
Permanent total disability	100	6,000
Arm above elbow, dismemberment or loss of use	75	4,500
Arm at or below elbow, dismemberment or loss of use	60	3,600
Hand, dismemberment or loss of use	50	3,000
Thumb, dismemberment or loss of use	10	600
Any 1 finger, dismemberment or loss of use	5	300
2 fingers, dismemberment or loss of use	12-1/2	750
3 fingers, dismemberment or loss of use	20	1,200
4 fingers, dismemberment or loss of use	30	1,800
Thumb and 1 finger, dismemberment or loss of use	20	1,200
Thumb and 2 fingers, dismemberment or loss of use	25	1,500
Thumb and 3 fingers, dismemberment or loss of use	33-1/3	2,000
Thumb and 4 fingers, dismemberment or loss of use	40	2,400
Leg above knee, dismemberment or loss of use	75	4,500
Leg at or below knee, dismemberment or loss of use	50	3,000
Foot, dismemberment or loss of use	40	2,400
Great toe or any 2 or more toes, dismemberment or loss of use	5	300
1 toe, other than great toe, dismemberment or loss of use	0	-
1 eye, loss of sight	30	1,800
Both eyes, loss of sight	100	6,000
1 ear, loss of hearing	10	600
Both ears, loss of hearing	50	3,000

[1] Bureau of Mines, Rules Governing the Award of Trophies in the National Safety Competition for 1936, p. 3.

[2] Dismemberment means severance of any part of bone.

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TABLE 2. - Accidents, by months, 1930-40

Month	Year	Company							Total
		A	B	C	D[1]	E	F	G	
January	1930-38	11	21	5	9	5	18	4	73
	1939	0	0	0	1	1	3	1	6
	1940	0	1	0	1	1	2	0	5
February	1930-38	4	9	5	9	7	17	2	53
	1939	0	1	0	0	0	3	1	5
	1940	0	1	0	2	3	1	0	7
March	1930-38	10	11	5	10	14	17	2	69
	1939	0	2	1	1	3	1	1	9
	1940	0	1	1	0	0	2	0	4
April	1930-38	4	17	5	5	8	19	5	63
	1939	0	0	0	4	0	3	0	7
	1940	0	0	1	2	0	1	0	4
May	1930-38	7	16	2	12	9	20	2	68
	1939	0	1	1	0	2	5	0	9
	1940	0	0	3	2	0	1	0	6
June	1930-38	3	13	6	6	8	23	1	60
	1939	0	1	1	3	5	3	0	13
	1940	0	0	0	1	0	3	0	4
July	1930-38	9	11	3	13	9	28	5	78
	1939	0	1	2	0	2	2	0	7
	1940	1	1	0	2	0	0	3	7
August	1930-38	6	7	5	5	13	19	7	62
	1939	0	1	0	0	2	1	0	4
	1940	0	0	0	1	2	3	0	6
September	1930-38	5	16	3	15	20	27	8	94
	1939	0	0	0	1	1	1	0	3
	1940	0	4	0	2	2	0	0	8
October	1930-38	11	12	6	11	11	27	6	84
	1939	0	0	1	0	1	1	0	3
	1940	0	2	3	2	1	0	1	9
November	1930-38	9	3	2	6	12	18	7	57
	1939	0	1	0	0	2	3	0	6
	1940	0	0	0	1	0	0	0	1
December	1930-38	2	15	6	9	14	24	2	72
	1939	0	0	0	4	2	0	0	6
	1940	0	2	1	1	2	0	0	6
Total	1939	0	8	6	14	21	26	3	78
	1940	1	12	9	17	11	13	4	67
	1930-40	82	171	68	141	162	296	58	978

[1] 1931-1940

TABLE 3. - Age of injured, 1930-40

Age	Period	Company							Total
		A	B	C	D[1]	E	F	G	
18-28	1930-38	23	42	13	22	39	76	16	231
	1939	0	1	1	2	4	9	1	18
	1940	0	1	2	3	5	8	2	21
28-38	1930-38	26	48	13	36	38	67	19	247
	1939	0	4	1	7	5	8	2	27
	1940	1	3	1	8	7	4	1	25
38-48	1930-38	26	36	17	26	24	58	12	199
	1939	0	3	0	5	0	7	0	15
	1940	0	3	3	2	3	0	0	11
48-58	1930-38	4	21	9	24	26	51	3	133
	1939	0	0	2	0	2	1	0	5
	1940	0	2	3	4	5	0	1	15
58-68	1930-38	2	4	1	2	3	4	1	17
	1939	0	0	2	0	0	1	0	3
	1940	0	3	0	0	1	1	0	5
68 and over	1930-33	0	0	0	0	0	1	0	1
	1939	0	0	0	0	0	0	0	0
	1940	0	0	0	0	0	0	0	0
Total		82	171	68	141	162	296	58	978

[1] 1931-40.

TABLE 4. - Parts of body injured, 1930-40.

Member	Company							Total
	A	B	C	D[1]	E	F	G	
Head	1	1	3	2	7	15	4	33
Face	1	9	-	4	4	11	2	31
Eyes	13	11	3	[2] 8	19	[2] 33	3	90
Shoulder	2	8	-	5	2	12	-	29
Arm	3	5	4	5	9	20	3	49
Wrist and hand	5	7	3	6	10	36	3	70
Fingers	[2] 14	22	6	[3] 10	30	[3] 35	[5] 8	125
Chest	2	10	3	8	3	11	2	39
Back	4	12	[4] 7	32	20	34	6	115
Pelvis	-	1	-	-	-	-	1	2
Groin	-	3	1	-	4	4	-	12
Hip	3	-	2	3	1	4	-	13
Thigh	1	-	1	1	1	2	-	6
Leg	9	13	6	15	11	17	2	73
Knee	2	10	7	5	7	5	4	40
Ankle	3	12	2	9	8	13	2	49
Foot	10	27	11	16	23	42	14	143
Toes	6	6	2	8	[2] 2	1	1	26
Internal	1	10	7	4	-	-	1	23
Infections	-	-	-	-	-	-	-	0
Heat	-	-	-	-	-	-	1	1
Fatal	2	4	-	-	1	1	1	9
Total	82	171	68	141	162	296	58	978

[1] 1931-40.

[2] 1 partial permanent.

[3] 2 partial permanent.

[4] 1 total permanent.

[5] 3 partial permanent.

TABLE 5. - Classification of accident causes, 1930-40

Causes	Company								Percent of total
	A	B	C	D1/	E	F	G	Total	
Handling material	12	2	24	50	33	105	17	243	24.8
Machinery	10	24	11	19	20	26	7	117	11.9
Falling persons	13	38	12	30	21	55	9	178	18.0
Hand tools	5	10	4	16	13	11	7	66	6.7
Falling material	5	34	1	3	14	20	2	79	8.1
Haulage	3	7	1	4	14	5	1	35	3.6
Nails	6	10	1	2	8	16	-	43	4.4
Burns	3	12	1	5	7	12	4	44	4.5
Electricity	1	8	-	2	7	5	3	26	2.6
Flying objects	9	6	6	2	6	18	1	48	4.9
Infections	0	-	5	1	2	2	2	12	1.2
Automotive equipment	9	-	-	2	3	2	-	16	1.6
Striking objects	2	-	-	-	1	7	1	11	1.1
Explosives	1	-	-	-	-	1	1	3	.3
Fumes	-	-	-	3	-	1	-	4	.4
Miscellaneous	3	20	2	2	13	10	3	53	5.9
Total	82	171	68	141	162	296	58	978	100.0

1/ 1931-40.

TABLE 6. - Operating companies accident experience, 1930-40

Company	Average number of men	Man-hours of exposure	Lost-time accidents	Days lost	Frequency	Severity
A						
1930-38	239	5,012,405	81	15,281	16.16	3.049
1939	221	605,698	0	0	00	.000
1940	189	513,068	1	125	1.95	.244
1939-40	205	1,118,766	1	15,406	.89	.112
B						
1930-38	363	9,273,351	151	12,232	15.83	1.271
1939	339	739,160	8	6,049	10.82	8.184
1940	318	700,820	12	12,286	17.12	17.539
1939-40	328	1,439,980	20	18,335	13.97	12.862
C						
1930-38	121	2,462,887	53	3,390	21.39	1.289
1939	125	263,000	6	6,043	22.81	22.977
1940	125	255,500	9	113	35.23	.443
1939-40	125	518,500	15	6,156	29.02	11.710
D[1]						
1931-38	239	4,007,516	110	3,611	27.23	.897
1939	212	499,810	14	159	28.02	.320
1940	270	537,341	17	164	31.64	.307
1939-40	241	1,037,151	31	323	29.83	.319
E[2]						
1935-38	179	2,122,699	131	8,524	68.07	3.542
1939	295	492,171	21	307	42.67	.624
1940	248	408,696	11	248	26.92	.592
1939-40	272	900,867	32	655	34.80	.608
F						
1930-38	208	5,076,853	257	11,709	50.69	2.291
1939	265	551,200	26	540	47.17	.980
1940	360	748,800	13	149	17.36	.199
1939-40	313	1,300,000	39	689	32.27	.590
G						
1930-38	312	7,069,102	51	7,648	7.32	1.159
1939	415	846,341	3	778	.354	.919
1940	382	783,017	4	64	5.09	.082
1939-40	399	1,629,358	7	842	2.73	.500

[1] 1931-40

[2] 1935-40.

TABLE 7. - Pebble-phosphate industry experience, 1930-40

	1930	1931	1932	1933	1934	1935
Number of mines, washers, and plants...	38	40	39	39	39	38
Production (long tons)...	3,166,218	1,900,806	1,402,334	2,066,900	2,249,304	2,269,891
Average number men employed.........	1,615	1,436	1,222	1,498	1,790	1,593
Man-hours' exposure	5,211,219	4,086,434	3,293,651	3,255,650	3,795,364	3,863,597
Lost-time accidents.....	100	104	47	79	90	119
Days' lost time	1,240	7,092	6,737	12,645	14,243	1,234
Frequency	19.38	25.45	14.21	24.26	23.69	30.79
Severity	.240	1.740	2.050	3.890	3.760	.319

	1936	1937	1938	1939	1940	1930-40
Number of mines, washers, and plants....	36	33	35	32	34	3
Production (long tons)...	2,442,520	3,000,338	2,740,938	2,547,782	2,780,800	26,567,83
Average number men employed	1,600	1,753	1,802	1,882	1,892	1,643.91
Man-hours' exposure	3,911,784	4,196,536	4,047,553	3,997,380	3,947,242	43,606,41
Lost-time accidents	92	107	95	78	67	9
Days lost-time..........	1,952	3,957	13,205	13,876	13,143	89,3
Frequency.....	23.51	25.49	23.47	19.52	16.97	22.
Severity........	.499	.943	3.262	3.422	3.329	2.0

SUMMARY

For the 11-year period 1930-40 the greatest number of lost-time accidents occurred in September and the fewest in February, with November running a very close second when working days are considered. These figures are given in detail in table 2.

As shown in table 3, accidents in the first three groups are almost directly in proportion to the number employed, while in the last three groups the accidents are fewer in proportion to the number of men employed. This might indicate one of two things or even a combination of the two: (1) The older men are or become safer workers, or (2) the older men have worked into less hazardous positions.

According to table 4, feet are hurt most frequently, being involved in 143 (14+ percent) of the lost-time accidents; fingers are next, with 125 (12+ percent); back third, with 115 (11+ percent); and eyes fourth, with 90 (8+ percent).

During the 11-year period Company A has had 2 fatalities and 1 partial-permanent disability (fingers); B has had 4 fatalities; C has had 1 total-permanent disability; D has had 3 partial-permanent disabilities (1 eye and 2 fingers); E has had 1 partial-permanent disability (toe); F has had 3 partial-permanent disabilities (1 eye and 2 fingers); and G has had 3 partial-permanent disabilities (fingers).

Company C has operated during the 11-year period with an average of 125 men and a total of 2,981,387 man-hours without a fatality, and D has operated since beginning (a period of 10 years) with an average of 240 men and a total of 5,044,667 man-hours without a fatality.

Handling material is the leading cause of lost-time accidents, with 168 (24.8 percent); falling persons is second, with 178 (18.0 percent), and machinery is third, with 117 (11.9 percent) lost-time accidents. These data are given in detail in table 5.

A lost-time accident is one that causes the loss of more than the shift or day on which the accident occurred.

The accident-severity rate indicates the number of calendar days of disability per thousand days worked:

$$\text{Severity} = \frac{\text{Number of days lost due to accidents}}{\text{Number of man-hours worked}} \times 1{,}000$$

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The accident-frequency rates indicate the number of fatal and nonfatal lost-time injuries per million man-hours worked:

$$\text{Frequency} = \frac{\text{Number of fatal and lost-time accidents}}{\text{Number of man-hours worked}} \times 1{,}000{,}000$$

Comparison of the frequency and severity rates for 1939 with those for the 9-year period 1930-38, inclusive, shows that five of the companies lowered or improved their frequency rates, and five (not all the same) lowered or improved their severity rates. Four of the companies improved both their frequency and severity rates. Comparison of rates for 1940 with those for the same 1930-38 period shows that four companies lowered their frequency rates, six lowered their severity rates, and four lowered both their frequency and severity rates.

Comparison of the combined rates for 1939 and 1940 with those for 1930 to 1938, inclusive, shows that five companies lowered their frequency rates, five their severity rates, and four both frequency and severity rates.

The accident experience of the pebble-phosphate industry of Florida is given in table 7. During the 11-year period, with an average of 1,643.91 men working a total of 43,606,410 man-hours, there have been 9 fatalities, 1 total permanent and 18 partial-permanent disabilities and 952 other lost-time accidents. The frequency rate has ranged from a low of 14.21 in 1932 to a high of 30.79 in 1935, the average being 22.63. The severity rate has ranged from a low of 0.240 in 1930 to a high of 3.890 in 1933, with an average of 2.048. Owing to the relatively small number of men employed, a fatality and a total-permanent or even a partial-permanent disability greatly influence the severity rate.

One thing that must be considered seriously is that during 1939 and 1940 there were three fatalities and one total-permanent disability compared with six fatalities and no total-permanent disabilities during the preceding 9 years. During this 2-year period the frequency rate has been reduced, but the severity rate has increased.

CONCLUSIONS

From a review of the accidents that occurred in 1939 and 1940 it would seem advisable as it did at the end of 1938 or as suggested in Information Circular 7100[8] for the individual pebble-phosphate companies of Florida to intensify their activities in accident prevention and consider the following protective measures for the prevention of some of the more numerous accidents:

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[8] Cash, Frank E., and Colbert, George W., Accident Experience at Pebble-Phosphate Operations in Florida, 1930-38: Bureau of Mines Inf. Circ. 7100, 1940, 13 pp.

1. The use of hard or safety hats would have prevented most of the three head injuries that caused 38 days' lost time.

2. Good shoes, better walkways and stairways, and proper instruction in lifting would have eliminated many of the 23 back injuries that caused 6,287 lost days. At least half of the 20 foot and toe injuries which caused the loss of 252 days, would have been prevented by wearing "hard-toe" or safety shoes, and another 25 percent would have been prevented by better housekeeping in and around plants.

3. Although wearing gloves is hazardous to some men under certain conditions, their use might have prevented some of the 12 finger injuries that caused 865 days time to be lost; stopping machinery for repairs and oiling and proper guarding of belts, pulleys, and gears would have prevented other injuries to fingers.

4. Wearing goggles would have prevented 80 to 90 percent of the 10 eye injuries that caused the loss of 149 days' time.

Although all of the companies hold regular safety meetings for certain classes of their employees and thereby accomplish a great deal in accident prevention, other companies and other industries have found that one of the best means of education and training in accident prevention is through monthly safety meetings for all employees, such meetings supplementing those of employee groups or supervisors.

The accident experience of the pebble-phosphate industry as a whole is good, but it can and should be improved. The various companies are making safety or accident prevention an operating aim of paramount importance, which should be strengthened to attain the desired results.

Analyses of the causes of accidents indicate that consideration, strengthening, or adoption of periodic safety meetings for all employees, better "job housekeeping", the more general use of protective clothing, and continuous training or education of all employees, supervisors, and workmen may be expected to improve the already good accident experience of the pebble-phosphate industry in Florida.